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ABSTRACT

This final report describes the activities and outcomes of a federally-funded program designed to meet the needs of high risk hearing impaired children with multiple handicaps from 0-2 years of age--a population not served at the time by local, state, or federal programs. The project's hypothesis was that the initiation of a "total communication" program at the appropriately early age for language stimulation and learning should prevent the development of learning problems for such deaf children and also obviate the attendant frustration and allied emotional problems of the children. The model was located in a public school in Boston. It used an integrated team approach, coordinated by a single case manager. Parent counseling was as an essential component of the program. During the third year of the program, a total of 66 high risk infants were located using identification procedures developed and refined during the first 2 years. After screening evaluation, 34 of these children were enrolled in the program. Curriculum activities focused on sensory stimulation, language processing and and cognitive and social development. Individual prescriptive teaching plans were developed for each child by the entire team and implemented by the primary facilitator in each case. At the end of the year, the children had attained 70% of the total number of objectives set. Additionally, 25 families were involved with 1 or more of the 3 parent counseling facets of the program (educational, intellectual, emotional). In addition to services to children and families, six other components of the program described in this report include: (1) Inservice; (2) Demonstration/Dissemination; (3) Advisory (4) Continuation; (5) Replication; (6) Coordination with Other Agencies. (SG)

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# Handicapped Children's Early Education Program
## P.L.91-230, Title VI, Part C

**Final Report**

**Boston University**

**Infant Stimulation Project**

August, 1977

**Grant No. OEG-74-2700**

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# THREE-YEAR OVERVIEW OF THE INFANT STIMULATION PROJECT

## Need for the Project

The need for an Infant Stimulation project was based upon the absence of or inadequacy of appropriate programs for the multiply handicapped deaf child, particularly in the early months of a child's life. By early intervention, some of the deleterious effects - intellectual, social, emotional, and linguistic - of a communication handicap might be averted. The Infant Stimulation Program sought to meet the needs of all identified high risk hearing impaired children with multiple handicaps regardless of etiology or diagnostic label from 0 through 2 years of age - a population not served at the time by local, state, or federal programs.

## General Goals

The general goals of the program remained unchanged from its initiation and were as follows:

> The Boston Public Schools, Horace Mann School for the Deaf (Jackson-Mann School), in conjunction with Boston University, Sargent College, Department of Speech Pathology and Audiology wished to collaborate on an experimental stimulation program for high risk infants with multiple handicaps in the age range from 0 through 2 years of age. The objectives of the program are:
>
> 1. To meet vital community needs for early identification, diagnosis and intensive sensory stimulation treatment of high risk infants with suspected and possible communication disorders and concomitant auditory dysfunction.

2. To provide stimulation and intervention as early as possible thereby maximizing the effectiveness of therapy and forestalling or minimizing the deleterious effects of a communication handicap intellectually, socially, and emotionally.

3. To provide audiological evaluation of hearing function for infants with known or suspected auditory dysfunction by providing complete otologic and audiological services to evaluate the causative conditions, and to advise parents as to treatment and prognosis of hearing disorders or other relevant medical problems.

4. To provide an intensive sensory-perceptual and cognitive stimulation curriculum integration strategy from infancy by

   a. Providing infants with learning experiences and activities designed to satisfy children's urges to think, invent, discover, construct and create, in the home and community.

   b. Providing and encouraging a wide variety of life experiences which stimulate physical, emotional and social development.

   c. Providing infants and very young children (under age two) with interactions (individual or in small groups if appropriate) with parents and teacher-clinicians in activities related to the development of conceptual and communicative skills.

5. To prevent muting by providing professional help in infancy by

   a. Providing trial educational programming as a basis for determining an infant's patterns of learning and the most appropriate educational procedures to meet the child's needs, and

   b. Providing infants with learning experiences which will guide and stimulate language development and aural-oral and/or manual communicative skills.

6. To provide individualized education and counseling services for parents to

   a. Strengthen and improve emotional relationships within the family of the multi-handicapped child,

   b. Provide professional guidance and counseling and to support parents,

   c. Alert parents to the special communication needs of their child,

   d. Offer parents whatever auxiliary education and counseling they need in order to participate in their child's social, emotional and intellectual development,

   e. Demonstrate to parents the supportive role of the school and to help them realize the importance of continuous cooperation between the home and school, and

   f. Provide referral services to obtain appropriate services by schools, medical centers, and other agencies.

7. To begin training at this early stage of development in order to achieve the maximum benefits of educating the deaf and severely hard-of-hearing population for the purpose of becoming useful members of this society.

8. To provide ongoing contact with educational settings in which the child may eventually be placed, through teacher consultations and demonstrations of teaching procedures, so that future educational settings can best meet the child's individual needs.

9. To provide periodic re-evaluations and follow-up services in order to determine the efficacy of recommended programs, and to suggest modifications of educational and counseling programs as indicated by the re-evaluations.

10. To train infant educators and help professional personnel become more effective in case finding, diagnosis, counseling assessment and education methodologies.

11. To utilize, develop and display procedures, methods and techniques that have wide application to the benefit of education for children in the regular school program as well as for children in other special education programs. The models to be developed should be replicable in any program offering similar services to similar age children with the same handicaps.

Specific objectives which are subordinate to these general goals, were developed for each component. These objectives are stated for eight components in the proposal: Direct services to children, Parent/family participation, In-service training, Demonstration/Dissemination, Advisory Council, Continuation, Replication, and Coordination with other agencies.

## Approach

Deaf educators are aware that traditional programs designed for the deaf have been demonstrated to be unsuitable for these multihandicapped and deaf children. Similarly special education programs for the mentally deficient make little or no provision for accommodation to the severe auditory deficiencies and concomitant lack of speech found in these children. In fact, because traditional educational programs are planned for children with a single handicap (e.g., deafness or mental retardation) rather than for those with multihandicaps in combinations such as deafness and mental retardation or deafness and emotional disturbance, etc., the benefits from such programs are questionable, and at best, severely limited.

The prevailing situation creates a difficult dilemma for the parent and the educator. Only two courses of action are

available and both are extremely unacceptable. One solution is to place the child in the traditional classes for the deaf where, by nature of the school's philosophy and curriculum design, the child experiences extreme frustration and defeat and often makes little or no progress. The alternative is to keep the child at home where he is spared the humiliation of exposing his mental inadequacy, but where no facilities or programs are available to foster his potential for whatever degree of development he is capable of attaining.

It is the project's educational philosophy that the children be considered as deaf first with other handicapping conditions as secondary.

The project's hypothesis was that an early and initial enrollment in a total communication program would help to obviate some of the devastating effects of our educational guessing and trial and error approaches. The initiation of a "total communication" program at the appropriately early age for language stimulation and learning should, hypothetically, not only prevent the development of learning problems for such deaf children but obviate the attendant frustration and allied emotional problems of the children. Further, better use of human and financial resources and a more productive program should result.

A child functions not only in relation to the contributing multiple disabilities, but as a single child who behaves

as an individual, reacting in a complex variety of ways to the multiple factors of his personality, physical condition, and environment. Therefore, the purpose of the proposed Infant Stimulation Program would be to describe the child's cognitive, communicative, and effective behavior as a basis for recommending appropriate educational progress rather than to "diagnose" specific disabilities or "label" his "primary" or "secondary" handicaps.

Several unique and important features of the model are described below:

(a) An integrated team approach in the use of staff is central to the model's operation. Each staff professional plays an integral part in the screening process and in making recommendations for therapy. In addition, they are involved in observation and management of the child in the therapeutic process. The team approach includes the communication and sharing of skills and competencies among the professionals so that each can understand and function within the domain of the several specialities which make up the team.

(b) Parent counseling is an essential component in the program and not considered a secondary or supplementary activity. Parent counseling as part of the early intervention process will assist in preventing or mitigating serious family problems generally caused by the presence of a seriously handicapped child in the house. Parent counseling is not limited to the traditional counseling models but focuses on the active involvement of the parent in the diagnostic and therapeutic process.

(c) The project's location in a public school in Boston is an important step in the acceptance of infant stimulation as a downward extention of the school's role in the educational management of handicapped children.

(d) Follow-up is provided not only to children who have been enrolled in and completed the program and have progressed to other programs, but also to those who have been screened but not accepted into the program.

## Services to Children

### A. Case Findings

Approximately 110,000 children are born each year in Massachusetts; 3% of these children (or 3,300) can be categorized as High Risk. It is estimated that some 440 infants are born yearly with hearing impairments of which some 229 have severe deafness. Of the approximately 2,500 children born retarded, 1,000 will require supervised custodial care. About 1,500 of those children are enrolled in special classes, throughout the Commonwealth. While it is difficult to determine the exact number of children who develop concomitant communication disorders and who would profit from enrollment in an early stimulation and intervention program, it was judged that 25-30 high-risk, multiply handicapped hearing impaired infants (0-2) would be identified. Referrals would be made through hospitals, private physicians, visiting nurses, neighborhood clinics, other agencies, etc. In addition, parents could refer themselves to the Infant Stimulation Program. The project would generate a network for a referral system of high risk multiply handicapped hearing impaired infants, by contacting agencies and advising them of the services of the project.

The following types of agencies were contacted and advised of the program:

1. State Health & Welfare Agencies
2. Local Hospitals
   a. Pediatric
   b. Otology
   c. Neurology
   d. High Risk nurseries
   e. Social service departments
3. Educators of the deaf
4. University personnel
5. Community leaders
6. Neo-natal in-service care facilities
7. Special Education Centers
8. Other infant stimulation programs

A successful identification procedure was instituted. This procedure consisted of: 1. Mass mailings to parents of infants born three to six months before the mailing date; 2. Mailings to agencies, physicians, school systems, etc.; and 3. TV and radio announcements.

B. Eligibility Criteria

The following eligibility criteria for children have been established:

Medical suspicion of auditory problem as a result of:

(a) Near family history of deafness.
(b) Congential syndromes with hearing loss as major diagnostic feature. (e.g., Klippefeil, Alport's Syndrome, etc.)
(c) Oral-facial deformities. (e.g., cleft palate, atresia, etc.)
(d) Syndromes associated with deafness (Rubella, Downs Syndrome, etc.)
(e) Ototoxity (administration of mycin drugs).
(f) Chronic middle ear infections.
(g) High fever diseases (104 +). (e.g., Meningitis, Chicken Pox, etc.)
(h) Birth defects with associated hearing loss. (e.g., Cerebral Palsy, Spinabifada, etc.)
(i) Cranial deformities. (e.g., Hydrocephalus, Mycrocephalus).

(j) Speech and language delay.
(k) Inflicted injury resulting in severe central-nervous system damage.
(l) Seizures resulting in central nervous system damage.
(m) Inconsistent response to sound.
(n) High bilirubin count.
(o) Prematurity: Low birth weight (under 5 lbs.) and failure to thrive.
(p) Deaf/Blind, etc.

While the project served infants from "traditional" families, children from the following types of family situations constituted the majority of children and infants served in the Jackson-Mann Community:

1. Non-English speaking families (Spanish, Chinese, Greek and Portuguese, etc.)

2. Single-parent families, teenage mothers.

3. Families with children having other types of handicapping conditions (Cerebral Palsy, blindness, orthopedic problems, emotional difficulties, etc.

4. Families with psycho-social problems such as alchoholism, narcotic addiction, or who have been found to be or are suspected of being child abusers.

5. Families with severe economic deprivation resulting in malnutrition, cultural deprivation, etc.

C. Screening and Diagnostic Evaluation

Infants appropriate for participation in the program were screened and identified by intake and assessment procedures devised by the staff. The results of the initial assessment provided baseline information for program development and evaluation.

The responsibility for the total evaluation of the development and progress of the individual child as shared

by various members of the professional staff. The evaluation procedures are divided into three phases: (1) initial screening, (2) diagnostic evaluation, (3) staffing and program planning. A fourth phase, program implementation follows upon the completion of the three evaluation phases.

1. Initial Screening

The initial screening process was devised in order to expedite intake because the complete assessment process is lengthy and costly, and also because time is critical to the early intervention strategy proposed by this program. This phase consists of:

a. Social worker's intake and review:
   Medical and social history is taken and family status is identified.

b. Audiological testing:
   (1) Behavioral observation
       a. free field use of noisemakers
       b. intensity calibrated speech
       c. intensity calibrated music
       d. conditioned orientation response audiometry (COR)
   (2) Objective hearing tests
       a. tympanometry
       b. statis compliance
       c. acoustic reflex testing

Following the above listed procedures of phase I, a mini-staffing is held, which includes: project director, social worker, and audiologist. During the mini-staffing the audiological findings are reported and medical and social history are reviewed. If an auditory problem is not suspected, further evaluation procedures will be limited to procedures necessary to assist in the proper placement of the child. At this point the social worker will seek other appropriate

agency follow-up and counsel the parent as to the appropriate program for the child. Until the time that the social worker no longer has contact with the parent and other agencies, and the child is placed elsewhere, the child will remain enrolled in the program. This procedure is followed because the program's philosophy of support and early intervention cannot permit these children and parents, who have serious problems, to be left without support and assistance simply because they do not meet eligibility requirements for this particular program.

2. Diagnostic Evaluation

If auditory problems are suspected, the child is found to be eligible for the program. Evaluation continues on into phase (2) complete diagnostic assessment.

This phase consists of:

a. Evaluation by an audiologist and a speech and language pathologist
b. Evaluation by a psychologist
c. Evaluation by an occupational therapist
d. Supplementary evaluation by consultant, as required (physical therapist, neurologist, opthamologist, otologist, etc.).

a. Audiological and language evaluation

1. There are three aspects to this evaluation procedure. The nature and degree of hearing loss is identified and described.

2. Receptive Expressive Emergent Language Scale (REEL Scale) is administered to the parent to estimate the child's receptive and expressive language function.

3. Analysis of samples of child's utterances.

b. Psychological evaluation. The psychologist evaluates the child and conducts an examination of his developmental status through the use of such standard instruments as the Bayley Mental and Motor Scales as well as through observations of parent-child interactions and free play behavior with a variety of toys. The standardized test is chosen by the psychologist according to the child's age or approximate level of function. In this examination the psychologist attempts to make a first estimate of the level of his "mental" development, social-emotional maturity and developmental level of gross and fine motor skills. Areas of development where the child may show unusual retardation or acceleration are noted, as well as any unique difficulties or handicapping conditions present.

To date various standard testing instruments have been used for initial and repeated examinations in an attempt to estimate the progress of the child in such aspects of growth as cognitive, emotional-social, language, motor development, Thus, the Bayley Mental and Motor Scales of Infant Development have been relied on, supplemented by performance items from the Cattell, Merrill-Palmer and Stanford-Binet Scales.

It is anticipated that in the future more satisfactory evaluations will be obtained through the use of the ordinal scales of Uzgiris and Hung, based on the work of Piaget. Thus, these scales will afford opportunity for clearer evaluation and comparison of various aspects of the child's development, as is suggested by their titles: I, the development of

visual pursuit and permanence of objects; II, the development of means for obtaining desired environmental events; IIIa, the development of vocal imitation, and IIIb, the development of gestural imitation; IV, the development of operational causality; V, the construction of object relations in space; and VI, the development of schemes for relating to objects. Since these are ordinal scales, they will afford new ways of assessing the level of development in individual infants and of determining the influence of various changes in home environments and of various educational techniques.

c. Occupational therapist evaluation. The major focus of the occupational therapist's evaluation is developmental in assessing gross and fine motor function, eye-hand coordination, reflex integration and play. The child is evaluated on a scale developed at the project for its usefulness in planning a logical and sequential treatment plan once the initial assessment is made. The registered occupational therapist conducts the evaluation while observed by the parents and available staff members. A written report as well as the evaluation form is included in the child's record.

d. Supplementary evaluation. Additional assessments may be requested by any of the staff members who feel that further specialized evaluation is desirable. A consulting physical therapist routinely evaluates physically handicapped children. Additional neurological, otological, and developmental

optometric and opthamological evaluations are available and requested as needed.

3. Staffing and Program Planning

Upon completion of diagnostic assessment, a full staffing is held. Staffings are divided into four major phases:

1. Review of social history - social worker reports on pertinent social information as it pertains to the management of the child.

2. Summary of pertinent medical findings.

3. Specialists' evaluations:
   a. Audiologist-speech pathologist presents findings and makes amplification recommendations.
   b. Psychologist reports findings from assessment battery.
   c. Occupational therapist reports findings from assessment.
   d. Physical therapist reports findings from assessment.

4. Staff discussion of significant aspects of the case. Supplementary services are considered.

5. Education prescription is recommended.
   a. An individualized curriculum is developed based upon findings at evaluation.
      1. educational objectives are delineated.
      2. short term goals are identified.
      3. sample activities are described briefly.
      4. follow-up evaluation date may be suggested.
      5. infant teacher assigned.

D. Prescription and Implementation

Upon completion of staffing, a program is designed for the child, and sessions are scheduled with the assigned Infant Teacher.

A. In the first three sessions of the educational program, the appropriate specialist will serve as a demonstration teacher for the Infant Teacher. The specialist will model

activities appropriate to the needs described in the prescription. Upon completion of demonstration stage of the program, the Infant Teacher will take over actual teaching under the supervision and direction of the appropriate specialist. The directive stage will continue for approximately three sessions, at the end of which time the Infant Teacher will independently conduct the sessions.

As needed, re-evaluation of the child will be scheduled. If re-evaluation warrants significant revisions in the prescription, the process may be repeated.

B. Hearing aid selection is based upon type of loss and degree of loss. In order to assure the child of appropriate amplification, several different models of hearing aids are utilized. Behavioral Observation Audiometry as previously described is used as test procedure. Based upon our findings, appropriate amplification is selected for the child. The audiologist then contacts the hearing aid dealer and serves as the advocate for the family until the process of obtaining appropriate amplification is complete.

Ongoing counseling with regard to the use of amplification is initiated. Upon completion of hearing aid selection, the audiologist meets with the parents to discuss appropriate management of the hearing aid. A home hearing aid program is implemented. The audiologist makes periodic follow-up on the progress of the home hearing aid program, meeting with the parents to discuss any problems encountered at home, and to

answer any questions they might have with regard to either amplification or hearing impairment.

E. Case Management Procedure

It has long been known that the individual child enjoys maximum opportunity for healthy development if he is cared for most of the time by one and the same mother figure. Professionals are beginning to realize that the same maxim holds for the extra familial services provided for children. This is especially important to realize in our attempts to help infants and young children with developmental disabilities. Such children need the expertise of many professional disciplines: medical, social service, psychological, etc., to fully understand the needs of such children. Diagnostic examinations from each professional are necessary.

Once such diagnostic information is obtained, however, and a rehabilitative program set up for the child on the basis of their recommendations, the problem arises of how to incorporate the educational and rehabilitation skills of each professional. Slowly, professionals are coming to realize that individual and separate handling and therapy by each professional is often counter-productive, i.e., the child responds adversely to handling and direction by many unfamiliar figures, however benign their intentions.

As a way of meeting this problem, the project has tried the use of what we call the "case manager" for each child. The C.M. may be audiologist, speech and language therapist,

occupational therapist or what not. What is essential is that she is the one who is responsible for coordinating the recommendations of each expert, setting up short term goals of therapy on the basis of these and putting them into effect in her sessions with the child.

The C.M. does not work alone, however. There is continual conferring back and forth, both in weekly staff meetings attended by everyone and by daily contacts and requests for advice when needs arise. The C.M. also is responsible for working with the mother or whoever is present in therapy sessions with the child, helping her to understand activities used - their purpose and results and encouraging her to participate in and carry on the therapy at home. The C.M. is the prime liaison between the clinic and its work and the home and the needs and hope for the child.

The C.M. as the one responsible for total management of each child's case, also takes care of contacts with other agencies. She picks up on suggestions from staff discussions of each child's problems and sees that appointments are made for whatever further examinations are needed, explaining their need to the parents, arranging appointment time convenient for them and helping them to meet them. Once the appointments are met, the C.M. is responsible for seeing that the professional reports are obtained and reporting back their contents to other members of the clinic staff. These members, in turn, help to utilize the diagnosis and recommendations from these agencies or consultants.

Thus, the C.M. is the "mother" of the extra familial education of the child in her charge, who incorporates and puts to use for the child the manifold bits of advice from other members of the staff, each one more expert in his own professional field than she - but not aware, as she is, of all the information and idiosyncracies of each individual child. Through her close and affectionate relationship to the child and its parents she is able, hopefully, to bring to bear on the child's rehabilitation, the wisdom of the experts.

In addition, the project has added to the team the regular services of a pediatrician. This addition has added a new dimension to the understanding of the medical component of handicaps of the children with whom the project works. The pediatrician has been able to serve as a valuable resource to the project staff members and has become an important new member of the team providing services for the children.

F. Curriculum

As this project focussed on high risk, multiply handicapped deaf infants, it utilized strategies from available sources in a variety of areas such as those curriculum approaches which are already available for the educational management of: a) deaf infants, b) developmentally delayed infants, and c) normal youngsters. In addition, it developed materials which met the individual needs of multiply handicapped-deaf infants (0-2) enrolled in the program.

Curriculum activities focused on the following areas:

A. Sensory Stimulation
B. Language Processing and Production
C. Cognitive and Social Development

A. Sensory Stimulation

The following sensori-perceptual intake processes were considered in the educational programming for infants enrolled in the project.

| | | | |
|---|---|---|---|
| visual | vestibular | pressure | haptic |
| fine motor | gustatory | pain | stereognostic |
| gross motor | olfactory | pleasure | baric |
| tactile | vibratory | temperature | spatial |
| | | | temporal, etc. |

Because each child is considered individually, activities programmed under these processes will vary depending upon the child's needs. Some children may need activities in all areas, some may require that only a few be considered. In general, we would expect that most children will require programming in the following five areas:

1. visual perception
2. tactile-haptic perception
3. gross motor
4. fine motor
5. vestibular

Therefore, a brief description of these areas is provided.

Visual Perception. In the Infant Stimulation Program the infants total "looking schema" will be studied, monitored, and enriched with specific emphasis on the following areas:

visual alertness
attention
explorations
pursuit

convergence, and
accommodation by changing target distances
eye-hand coordination

Special attention is paid to enriching the visual surroundings by using highly contrasting colors, as well as various forms against a dull background. As examples, multicolored sheets are used in place of white ones and figured crib bumpers are employed. A variety of targets for visual explorations are also displayed. Interesting things to look at such as mobiles are included and looming objects are presented as well. Head and trunk motions are induced by placing the infant on the stomach and suspending objects over his upper body. Rotations of the head and head-rearing are encouraged by removal of bumpers. Movement of the arm, hand, and figures within the visual field is encouraged. Visually monitored batting progress is noted. The onset of swiping at visible nearby objects is charted.

Tactile - Haptic Perception. A wide variety of tactile experiences is provided. Targets for tactual explorations are used. Increased handling and vestibular stimulation are provided. Tactile explorations of nearby objects are encouraged and reach, grasp and release patterns are elicited. As an example, the infant is placed on different types of surfaces, such as terrycloth, fur, satin, velvet, shaggy wool, sculptured wool, nubby fabric, linoleum, etc. While on the "textured rug" free play, swaddling, and "instinctive" explorations is encouraged.

Where appropriate, the occupational therapist-teacher moves the limbs of the infant through a full range of motion. During this activity, the therapist-teacher talks with the infant, identifying and labeling body parts as they are touched and handled:

Ex: Leg, hand, arm, foot, head, etc. In addition, emphasis is placed on labeling of positions in space by denoting the positions which correspond to the location of the extremity (e.g., up, down, etc.)

Gross Motor. The gross motor and fine motor activities are carried out primarily under the direction of an occupational therapist and physical therapist. The overall goal is to increase coordination and reflex integration.

A program of carefully selected developmental activities based on neurophysiological principles is followed including proximal-distal sequence and successful integration of primitive postural reflexes. Stabilization of trunk and proximal joints is developed before fine coordination and tasks requiring more precise control are introduced. Development of high level righting reflexes and protective reactions are encouraged for the safety and comfort of the child. Types of activities included in this category are:

Reaching for toys
Shaking toys
Hitting suspended toys
Pulling suspended toys
Squeaking toys
Grasping and handling objects of different sizes and shapes
Stretching and flexing legs
Rolling body into a ball

Rocking on the stomach
Doing somersaults
Bouncing the body to music
Bending to pick up objects
Pulling up on heavy furniture

Fine Motor. It is recognized that the discovery of the hand is, in part, a function of the availability of interesting objects (White, 1969), and that hand regard behavior can be facilitated. Infants are provided with targets for grasp development. Materials are presented to the right hand, the left hand and at mid-line. Where appropriate, an extension rod is used as well. Hand touching at the mid-line is observed and hand regard is charted. Efforts are made to engage the infant in hand play so that he may be led to acquire cognitively relevant information. Types of activities to be included in this category are:

Reaching over obstacles for toys
Using a support, such as a pillow, to obtain a toy placed on top of the support, but out of the child's reach
Using a string horizontally to obtain a toy tied to the string
Using a string vertically to obtain a toy tied to the string
Putting a chain into a box
Using a stick to obtain an object
Fingering new foods and new textures of familiar foods

Vestibular Stimulation. Formerly it was believed that a certain stage of maturation had to occur before stimulation could be assimilated by the infant. It is now understood that the stimulation is necessary for maturation.

The role of the vestibular system is often overlooked because many of its functions either take place largely below the level of awareness or their importance is taken for granted unless they are disturbed. In spite of this lack of conscious awareness of the significance of the vestibular system, the infant likes to be rocked, and the toddler enjoys being swung or tossed in the air. Infants enjoy stimulation of the vestibular apparatus which challenges equilibrium.

While considerable attention is paid to the child as he acquires the skills to become a "terranaut," attention is also given to the skills of becoming an "aquanaut". The therapeutic effects of water have long been recognized. Simple water play is encouraged. The unique properties of water are explored systematically also (temperature, splashing, bubbling, floating, etc.) Related vocabulary and concepts are considered and included in lesson planning. When ready, infants are immersed in water with a small wading pool used at first.

B. Language Processing and Production

The Language Processing and Production component of our curriculum consists of three areas:

1. Total Communication
2. Oral Curriculum
3. Auditory Training

Total Communication Curriculum. Several oral deaf educators have developed infant stimulation programs (Ewing, Downs, Project CREED, Tracy Clinic, etc.) More recently,

proponents of total communication (McCay, Schlesinger, Meadow, etc.) have developed infant stimulation programs using a total communication approach. At the present time, there is lack of agreement among educators concerning the efficacy of one approach over the other.

The use of manual communication or American Sign Language (ASL) in classrooms for the deaf has been a subject of great controversy. The Oralist's position is that the use of ASL impedes the use of speech in deaf children and, because ASL does not follow English word order and semantics and thus impedes their language development. The "manualist" position is that children with severe auditory impairment suffer undue frustration trying to learn language when they cannot hear and suffer from a profound loss of information exchange typically available to the normally hearing child. They also maintain that ASL does not interfere with oral speech development and have presented research findings to support this assertion.

Recent attempts to compromise this situation are found in the use of "total" communication, which is the simultaneous use of speech and signs. There have also been attempts to directly modify the structure of ASL to make it linguistically parallel to English. A program developed by Anthony at the University of Denver uses a system based on a morphemic analysis of language, creating new signs which represent bound morphemes in English, such as verb tenses, prefixes, suffixes, as well as the copula. It differs significantly

from ASL, and is believed by some to give proper language models to deaf children via the intact visual modality.

Both "oral" and "total" (signed English and speech, manual and oral) communication curricula are available as alternatives in the educational management of infants enrolled in the program. In this program, the total communication sequence parallels that of the oral program so that the effects of both methods of education are reinforced. There are few schools which offer both programs as alternatives to the educational management of hearing impaired infants. It is the design of this project to provide both of these alternative types of opportunities to the children to be served.

The parents are invited to participate in discussions concerning the similarities and differences between total and oral communication. It is explained that it may or may not be necessary for their children to "sign". Care is taken in these discussions to avoid indicating whether or not their child will be able to learn to speak.

After preliminary discussions about the possibility of the presence of handicapping conditions, explain the nature of the experimental project is explained. We acknowledge the difficulty of predicting the exact outcomes. We tell parents how much we need their help in the sharing of the decision making aspects of the project and the importance of their follow-through in carrying out suggested activities. Though we do a certain amount of counseling, we leave the ultimate

decision with regard to the choice of total or oral communication in the hands of the parent.

In keeping with the findings of Schlesinger and Meadow (1972), that parents sustain more interest and interactive communication with their child when they learn manual communication before the child, the parents are taught signed English. Thus, it is the parents who teach the child language through their combined use of manual communication and speech. To this end the project has a manual to be used by parents to teach simple signs to themselves and their children.

The overall goal of the "total communication" sequence is the acquisition of language in a normal inductive manner by simultaneous use of speech and signed English.

Oral Curriculum. The overall goal of the aural-oral sequence will be to facilitate normal acquisition of language through intense language bombardment and maximum use of residual hearing. As developmental psycholinguistics has uncovered the sequence of language acquisition for normally hearing children, educators of the deaf have indicated that children who sustain only auditory impairment should be able to learn language in a similar fashion. Chomsky (1967) has speculated that such children, providing they do not have disabilities of the central nervous system, should be able to acquire language in the typical progression.

Keeping this philosophy in mind, the major focus of this aspect of the infant stimulation curriculum is the development of skills basic to the comprehension and expression of language. The aural-oral aspects of the program for the hearing impaired infant stresses language bombardment relevant to all modalities, i.e., auditory, visual, oral, tactile, etc.

Parents are educated in techniques designed to facilitate and stimulate language in their child. The program emphasizes modeling and expansion of the child's utterances. We use available infant curriculum approaches (Gordon, Northcott, Ewing, Sanford, Schering, etc.) and develop additional intervention strategies as needed.

Auditory Training. Each child is fitted with appropriate amplification as determined by the audiologist.

The auditory training program described by Northcott, Pollack, Clark, and Ewing is used in addition to the development of strategies unique to our setting.

The auditory training program is based upon the philosophy that listening must be a continuous activity which leads to an eventual integration of functional hearing into the child's schema. The approach to auditory training is organized develppmentally. Each skill builds upon the other. The development of the skill leads into either the "oral" or "total" approach to the development of language perception and production.

The auditory training program covers the following six areas:

1. Alerting the child to sound
2. Localization of sound
3. Discrimination of sound
4. Memory and sequence of sound
5. Auditory figure-ground training
6. Home hearing aid program

1. Strategies designed to alert the child to sound utilize four different sound sources. They are:

   1. Calibrated noisemakers
   2. Music
   3. Warblet
   4. Voice

   Focus on six suprasegmental features:

   1. Pitch
   2. Volume
   3. Distance
   4. Duration
   5. Quality
   6. Rhythm

   Each sound will be introduced in a variety of such patterns as:

   1. Introduction of abrupt sounds
   2. Presentation of continuous sounds
   3. Cessation of sounds

2. Localization of sound.

   a. right
   b. left
   c. up
   d. down
   e. front
   f. back

   Another major component of our auditory training program focuses on the development of localization skills and distance hearing. Research has shown that there is a correlation between the child's ability to localize sounds on varying planes and his general developmental status. The project has developed a unique system of plotting such information. Upon entrance into the program an "auditory localization field" will be charted for each child. Strengths and weaknesses will be noted, and appropriate activities will be included in an individualized auditory training program.

3. Discrimination of sounds is developed using the following stimuli:

   A. Environmental noise
      a. household items
      b. traffic noises
      c. pets
      d. toys
      e. playground, etc.

   B. Voice
      a. inflection
      b. rhythm
      c. pitch

   C. Speech
      a. vowels
      b. consonants
      c. words
      d. phrases
      e. sentences

4. Memory and Sequencing of Sound.

   Within each of these major categories a variety of stimuli variables are introduced so that generalization of listening skills can take place. For example:

   A. Sounds
      Pitch - high then low - low then high
      Volume - loud then soft - soft then loud
      Distance - near then far - far then near
      Duration - long then short - short then long
      Quality - harsh then pleasant - pleasant then harsh
      Rhythm - fast then slow - slow then fast

   B. Voice and Speech

5. Auditory Figure-ground.

   Children are assisted in the detection of competing messages by activities which will be presented in a backfround of controlled noise. Materials from the Developmental Program in Auditory Perception - Sound Order Sense (Semel, 1970) will be used extensively.

6. Home Hearing Aide Program.

   Because of the complex nature of amplification a "home hearing aid program" has been devised and is implemented upon the child's entrance into the program. The program, written for parents, contains information about two major categories:

(a) Care and maintenance of the hearing aid. This section helps the parent to recognize common problems that arise from the use of amplification, and suggests methods of repair for the aid. A daily hearing checklist is included.

(b) Child's reaction to the use of amplification. This section includes a series of charts which when completed detail the amount of time the aid is worn each day, and the child's responses to the hearing aid. The parent is also asked to indicate any unusual or interesting auditory behavior by the infant.

Due to the problem of hearing aid breakdown and subsequent loss of amplification, a "loaner" system has been developed, with clinical aids furnished to the child by the program whenever necessary.

C. Cognitive and Social Development

Cognitive and social aspects of our program have been outlined by Lally and Honig (1974b). Briefly, the activities emphasize:

1. Developing a concept of the permanence of objects even when the objects have dropped from one's sight.
2. Inter-coordination of actions by finding ways of acting on objects and of using toys and materials appropriately.
3. Spatial relationships.
4. Causal relationships.
5. Classification.
6. Polar concepts.
7. Development of gestural imitation by increasing the repertoire of actions and copying models.

1. Developing a concept of the permanence of objects even when the objects have dropped from one's sight.

Activities designed to develop the concept of the permanency of objects include the following:

a. Playing peek-a-boo
b. Horizontal following of toys
c. Finding toys after visible displacements under screens
d. Finding toys after invisible displacements
e. Putting toys into containers and finding toys under containers

2. Inter-coordination of actions.

Among activities which are introduced to stimulate and develop inter-coordination of actions are the following:

a. Hitting two toys together
b. Patting a toy animal
c. Making a doll walk
d. Stretching an elastic bracelet
e. Throwing toys
f. Adorning one's self (with a pop-i bead necklace, for example)
g. Drinking from a cup

3. Spatial relationships.

The awareness of spatial relationships will be stimulated and developed using activities such as:

a. Finding a toy by its sound
b. Following the trajectory of a toy
c. Bunching a chain and putting it into a box
d. Nesting several boxes
e. Rolling objects down a plane
f. Creeping around a barrier, such as a rocking chair, to retrieve a ball rolled underneath the chair

4. Causal relationships.

The concept of cause-effect relationships will be developed by introducing activities such as:

a. Bringing an unseen object to sight
b. Ringing a bell to make a sound
c. Turning a key to make a mechnaical toy run
d. "Zooming" a friction car to make it go
e. Working a jack-in-the-box

5. Classification.

Classification and Seriation Skills are stimulated by choosing and grouping similar items and/or pictures. Classification may be required using: shapes, forms, colors, textures, sizes, foods, animals, etc.

An example of a game which is used to develop classification is as follows:

"Let's find all the doggies and put them in this basket with the mommy dog."

Many infants may only be able to handle a 3-item seriation problem, such as nesting three sizes of orange juice cans or lining up drinking straws of three lengths in order.

6. Polar Concepts

Polar concepts are taught with concrete actions. Examples of concepts to be developed are:

hot-cold
wet-dry
long-short
bumpy-smooth
soft-hard
big-little
happy-sad

7. Development of Gestural Imitation by increasing the repertoire of actions and copying models.

Activities designed to develop gestural imitation include:

a. Imitating a familiar visible gesture, such as pat-a-cake
b. Imitating an unfamiliar visible gesture, such as crook-a-finger
c. Imitating a familiar invisible gesture, such as tilting the head back and forth
d. Imitating an unfamiliar invisible gesture, such as an eye wink.

Activities designed to develop imitation of sounds include:

a. Imitating baby sounds
b. Imitating unfamiliar sounds, such as "la-la"
c. Labeling objects, people, feelings, actions, places, times, questions and directions
d. Listening to stories
e. Carrying out verbal requests with appropriate gestures

G. Follow-Up

1. Placements for children not accepted into the program.

   A. Original referral agencies are reactiviated, i.e., staff contacts agency with information this program has compiled.

   B. Coordination is begun with agencies already having some involvement with the family.

   C. New agencies are contacted as required.

      1. Locate appropriate agency in terms of services offered.

      2. Discuss information about agency with family.

      3. Contact agency to discuss referral through (a) telephone contact or (b) personal contact if appropriate and if need be as the family's advocate.

      4. Forward project's reports to the appropriate agency.

      5. Contact is maintained with family and/or agency to ascertain (a) family's involvement in the diagnostic-evaluation process of the agency and (b) family's acceptance into agency's program.

2. Placement process for children who are accepted in the program.

   As part of the placement process for children who have completed the Infant Stimulation program, the staff performs the following tasks:

   First Year Follow-up

   At three month intervals, after referral to another agency the family is contacted. Various types of contact will be used: 1) personal contact either at home or in center, 2) telephone contact, 3) contact by letter.

   Staff members involved in follow-up contact are:
   1) original infant teacher assigned to the family, or
   2) original social worker who saw family.

   Second Year Follow-up

   Second year follow-up is reduced from the level given in the first year. Essentially, it will consit of telephone contacts made by the social worker or infant teacher at

six month intervals so that the family will have two follow-up contacts within its second year away from the program.

## Services to Parents

In working with parents the project developers have recognized that the parents have differing needs due to the wide variations observed in the degree of disability of the child (mild to profound), as well as a wide range of differences in social, economic, and cultural backgrounds. In order to meet the diversity of needs in the parent population, the project has devised a new model for parent counseling services. This new parent-counseling model has a three-pronged approach, educational, intellectual, and emotional.

The educational approach assists parents in alleviating their apprehensions and answer their questions about their child's training program. It assists parents in (a) observing the training program so that the methods can be used in follow-up at home; and (b) gaining a greater understanding of the teacher's contribution to the child's growth. It should serve to reinforce the parent's willingness and interest to continue in the program and assists in building better communication between staff and families for the advancement of the child.

The intellectual approach enables parents to (a) meet in a group setting with other parents of handicapped children to gain greater information by having exposure to experts that they would not otherwise have, and (b) be in a socially supportive environment in which information can be exchanged and problem-solving done more effectively. It also permits families to establish mutually supportive relationships with each other.

The emotional approach enables parents to develop a meaningful relationship with a professional counselor who can understand, accept, and deal with the parents needs, feelings, and emotional reactions to having a handicapped child.

Parent interaction at the educational level includes observation by the parent of the teacher working with the child. The Infant Teacher explains what she is doing and why. The Infant Teacher next asks the parent to carry out some of the activities at home. In the subsequent carry out session, the Infant Teacher asks about the success of the parent's efforts at home. The Infant Teacher then asks the parent to demonstrate what was done. Gradually, the Infant Teacher involves the parent in the actual teaching session with the ultimate goal of the parent's taking-over of the tasks in the teaching sessions with the Infant Teacher supervising.

The parent interaction at the intellectual level includes inviting parents to the group meetings. The groundwork for group meetings was established during the early contact with the parent. The meetings are scheduled at a time most convenient for the majority of the parents. The group meetings run for four weeks, two hours per session. Specialists are called in to conduct each session. In the first session a specialist discusses child development issues. The second session deals with physical problems. The audiologist discusses the specifics of hearing impairments, and there is an overview of other handicapping conditions that might be involved with hearing impairment. The third and fourth sessions cover psychological issues. A specialist such as the social worker is responsible for the discussion. Areas to be covered include understanding children's basic emotional needs, focussing in on specific feelings related to acceptance-rejection, and birth order. Learning modalities are discussed along with strength bombardment.

The parent interaction at the emotional level involves individual or couple counseling with the social worker. Ideally, counseling occurs one hour per week; however, the actual amount of time the parent interacts with the social worker depends upon the parent's emotional needs. The decision to interact with a parent in individual counseling is based on either the parent's request and/or the social worker's socio-emotional assessment of the parent(s). The

determination of need for individual and/or couple counseling can occur at all levels of the family's involvement with the Project: as identified by the social worker during the intake procedure, by the specialists during the diagnostic evaluation of the child, by the Infant Teachers during the treatment process. The focus of counseling will include intra-psychic issues, external issues, and parent-child interactions based on individual needs.

The social worker is the staff person responsible for activating support systems within the community. This includes making referrals to the appropriate agencies or agency when the Project services are no longer appropriate for the child.

## Other Components

Services to children the Parent/Family components were, of course, the principal service components of the Infant Stimulation Project. Six other support components also defined efforts of the project: In-Service, Demonstration/ Dissemination, Advisory Council, Continuation, Replication, and Coordination with Other Agencies.

### In-Service

The objective of the In-service component was to increase the knowledge and expertise of project staff in the areas concerned with infant stimulation curriculum.

In-service topics are planned and coordinated by the Project Director in advance. Topics are decided upon by formal discussion with staff members concerning areas where a need for in-service is apparent.

In addition, informal in-service is important to the program. When important articles, books, reports, etc. are obtained by a member of the staff, they are reviewed by the entire staff. In this fashion, the staff can be helped to keep abreast of current writings in various specialized areas associated with the program.

Reports of conferences and meetings attended by staff constitute another in-service feature. Any staff member who attends a professional meeting, is required to present to all of the staff the most important information and skills obtained at the meeting. In this fashion, the maximum benefits from professional conference attendance are accrued to all staff members. In addition, infant teachers visit outside agencies once a month. A report of their visit is then presented to the staff as part of in-service function.

Demonstration/Dissemination

The objectives of this component were to inform the professional community about the project and to increase the quantity and quality of professionals in infant stimulation by providing clinical training placements.

The Infant Stimulation Project served as a demonstration project to students, to parents of handicapped children, to educators, to health professionals and to administrators involved in early education of multi-handicapped and deaf children. Demonstration and dissemination occured through: on-site visits, media production (slide tape and video tape programs), news releases, distribution of brochures and materials, and numerous presentations at professional conferences and workshops by the project director. An important aspect of the demonstration/dissemination component has been the training of professionals in infant stimulation processes. During the project a total of sixteen undergraduate and graduate students received intensive training through clinical placements. In addition, approximately 100 students participated in workshops conducted by the project as part of related coursework at Boston University.

Advisory Council

In addition to serving as an advisory group of experts and consumers, the advisory council was charged with assisting the project in dissemination, replication, and continuation activities.

The Advisory Council consisted of:

(a) Two parents of children in the program.
(b) Five audiologists representing the major diagnostic centers in the area.
(c) A representative of the deaf adult community.
(d) Two faculty members from Boston University involved in deaf education and audiology.

(e) A representative from the Boston Center for the Blind.
(f) One representative from the Massachusetts State Department of Education.
(g) A representative of the professional special education community.
(i) A representative from the Jackson-Mann community.

Continuation

The objective of this component was to develop plans for continuation of the project after its Title VIC grant expired. A variety of areas were investigated and approached: private funding agencies, the Federal government, the Massachusetts State Department of Education, the Boston Public Schools, and Boston University. The efforts of this component resulted in the project's continuation under the auspices of the Massachusetts Department of Public Health, Boston University, and the Boston Public Schools.

Replication

The goal of the Replication component was to develop tools to facilitate replication of the project for hearing impaired children. Replication strategies included: efforts of the Advisory Council members, production of slide-tape and video-tape programs, workshops, training of graduate and undergraduate students, and presentations at professional conferences and meetings.

Replication strategies will continue after the funding cycle by means of two courses entitled Educational Management of High Risk Infants and Practicum in Infant Education

to be offered at Boston University and conducted by the Infant Stimulation Program, as well as continued presentation of the project's philosophy, methods and results at professional conferences and meetings.

Coordination With Other Agencies

Coordination plans with organizations focused on insuring a closer working relationship to maximize the services to the child and family. The general areas of coordination were:

1. Referrals.
2. Medical management of the child's case.
3. Delineation of the delivery of social services to the family and/or coordination of the delivery of social services to complement and support each other.
4. The provision of additional services, such as occupational therapy, and peer group experiences.
5. Updating and exchanging information on a child's case.
6. Coordination of overlapping services to insure continuity, common goals, and similar home training techniques for the child.
7. Placement in an appropriate program after leaving the Infant Stimulation Project.

During its three years, the project coordinated efforts with 27 organizations - schools, hospitals, social agencies - and established closer working relationships between these organizations and the Infant Stimulation Project.

THIRD YEAR PERFORMANCE REPORT

Direct Services to Children

Objectives

1. To implement a procedure for identifying a population of multi-handicapped hearing-impaired infants (0-3) in the program.
2. To identify children (0 through 3) with suspected auditory problems.
3. To utilize appropriate assessment techniques for each child enrolled.

Attainments

Case finding for identification of multi-handicapped hearing-impaired infants (0-3) followed the procedures developed and refined during the first two years. The procedure primarily consisted of Crib-o-Gram screening at the Boston Hospital for Women, mailings of "mother's letters" to new mothers, posters and brochures at selected sites, TV and radio public service announcements, and a referral network with other agencies and individuals dealing with handicapped infants or newborn children.

Since July, 1976, 130 newborns have been screened with the Crib-o-Gram hearing screening technique. All babies tested were inpatients at the Special Care Nursery at the Boston Hospital for Women. Of the 130 tested, 104 babies passed and 36 failed the Crib-o-Gram screening. All children who failed the Crib-o-Gram screening were eligible for complete diagnostic evaluation.

In July, 1976, 1,260 letters to mothers of newborns were mailed in the greater Boston area. Of the 1,260 letters mailed, 305 were returned. Eighty-seven were considered high risk for hearing impairment. Of the high risk infants, 74 were telephoned and 13 were lost to follow-up. Of those telephoned seven expressed concern and interest and five were seen for audiological evaluations. No significant hearing loss was found in any.

A new mailing of 1,000 letters to mothers of newborns is scheduled at this writing for June, 1977.

Agencies and individuals participating in the referral network consisted of physicians (pediatricians, otologists, neurologists, child psychiatrists), schools for the deaf, organizations for the deaf, State Health and Welfare agencies, local hospitals, visiting nurse organizations, and public school systems. Over 700 letters were mailed to such agencies and individuals in 1976-77. The breakdown of such mailings was as follows:

| | |
|---|---|
| 1. Physicians (pediatricians, otologists, neurologists, child psychiatrists) | 338 |
| 2. Schools for the deaf and deaf organizations | 75 |
| 3. State Health and Welfare Agencies | 140 |
| 4. Local Hospitals, Pediatric, Otology, Neurology, High Risk Nurseries, Social Service Departments | 123 |
| 5. Visiting Nurses Organizations | 33 |
| 6. Public School Systems and other schools | 72 |
| | 781 |

Agencies and individuals resulted in 14 referrals to the project.

In addition to these activities, television and radio interviews and appearances by the Project Director and public service announcements this year have served as new information sources in the referral network. These included: an interview with the project director on WRKO, interviews on three local television stations, and public service announcements on 18 radio stations and in 14 newspapers. This media exposure resulted in six referrals to the program.

One hundred and fifty-five referrals were received from all sources. A total of 66 high risk children were located by these initial identification procedures. All children were screened further and 26 of these were identified as eli eligible for diagnostic evaluations.

The assessment battery utilized previously was reviewed and revised for 1976-77. The following represents the range of assessment tools from which appropriate techniques were selected for the evaluation of each child.

1. The Denver Development Screening Test
2. Audiological Evaluation
3. Psychological Evaluation
   a. The Bayley Scales of Infant Development
   b. The Stanford-Binet Intelligence Scale
   c. The Merrill-Palmer Scale of Mental Tests
4. Occupational Therapy Evaluation
5. Physical Therapy Evaluation
6. Educational Evaluation
   The Development Checklist
7. Speech and Language Evaluation
   Houston Test for Language Development

As an example of how these instruments were used, Table 1 identifies the frequency of use of each assessment instrument for the identified children through December of the project year.

Table 1

Frequency of Use of Assessment Instruments[a]

| Assessment Tool | Number Administered[b] | Percent of Children Evaluated |
|---|---|---|
| Denver Developmental Screening Test | 18 | 55% |
| Audiological Evaluation | 21 | 64% |
| Psychological (total) | 17 | 51% |
| Evaluation | | |
| a) Bayley | 14 | 42% |
| b) Stanford-Binet | 2 | 6% |
| c) Merrill-Palmer | 1 | 3% |
| Occupational Therapy Evaluation | 7 | 21% |
| Physical Therapy Evaluation | 3 | 10% |
| Education Evaluation (Developmental Checklist) | 2 | 6% |
| Speech and Language Evaluation | 3 | 10% |

[a] Through December, 1976

[b] Each child is not necessarily evaluated with each instrument. The choice reflects the results of screening.

Test data available on 21 children are shown in Table 2. These data were obtained from the earliest test administration available in the projects records using the Denver Developmental Screening Test. The number and percent of children with developmental delay in each area are shown. The largest percent of children were found to be developmentally delayed in Language, followed by Motor, Social and Fine Motor/adaptive skills.

Table 2

Areas of Developmental Delay According to the Denver Developmental Screening Test in Children Enrolled in Program 1976-77
N= 21

| Area | Developmental Delay | |
|---|---|---|
| | Number | Percent |
| Motor | 10 | 48% |
| Language | 14 | 67% |
| Social | 8 | 38% |
| Fine Motor/Adaptive | 5 | 24% |

* Some children have more than one area of developmental delay.

Objectives

4. To develop an educational program on an individualized basis.

5. Ninety percent of the children will achieve eighty percent of the specific instructional objectives.

Attainments

Services provided to the children followed closely the diagnostic, staffing and curriculum model described earlier in this report (See Overview). Curriculum activities focused on a) sensory stimulation, b) language processing and production, and c) cognitive and social development. The staffing pattern is, of course, a team approach utilizing appropriate specialists and parents to complement the role of the infant teacher. The team approach was coordinated by a "case manager" - a concept newly instituted this year and described previously (See Overview). The case manager may be any of the professional staff members who is assigned principal responsibility for the child. This individual is responsible for coordinating the recommendations of each expert, setting up short term goals of therapy on the basis of the recommendations, and putting them into effect in her sessions with the child.

A total of 34 children were enrolled during the year; eleven children were placed in other appropriate programs. Twenty-four children were enrolled on a long-term basis and received continuous service in the project. Twenty-one were seen in

program, three were seen in nursery school at Jackson-Mann School, as they were simultaneously enrolled in both programs. Individual prescriptive teaching plans are developed for each child. Prescriptions were developed by the entire team after review of the entry evaluations, and implemented by the primary facilitator in each case. A sample prescriptive teaching plan is presented in Figure 1.

NAME John Doe DATE October, 1976

| DEVELOPMENTAL AREA | GOALS |
|---|---|
| Self-Help Skills | 1. To drink from a cup independently.<br>2. To grasp a spoon securely palm down and bring it to mouth. |
| Receptive Language | 1. To respond to rhythm and music by body and hand movements (listening).<br>2. To differentiate household sounds.<br>3. To respond to simple verbal requests. |
| Expressive Language | 1. To try to name familiar objects. |
| Gross Motor Skills | 1. To toddle, holding one hand of adult. |
| Fine Motor Skills | 1. To perform simple manipulations. |
| Social Skills | 1. To play interactive games such as patty-cake. |
| Pre-Orientation and Mobility Skills | 1. To identify body parts on another person.<br>2. To understand simple size concepts.<br>3. To have an understanding of where things belong in the home.<br>4. To travel between familiar rooms in the home. |

Figure 1. Sample Prescriptive Teaching Plan

Table 3 shows the analysis of goals established for the children and goals achieved by them. A total of 222 goals were set in seven developmental areas as part of the individually prescribed plans for 17 infants. An average of 12 goals per child was established, although the number ranged from 3 to 21 depending upon the child's needs.

Table 3

Analysis of Goals Presented and Achieved
7/76 - 7/77)

| | |
|---|---|
| Total number of goals prescribed: | 222 |
| Total number of goals achieved: | 156 |
| Percent of total goals achieved: | 70% |
| Average number of goals prescribed: | 12 |
| Range of goals prescribed: | 3-21 |
| Number of children: | 19 |
| Number of children who attained at least 80% of goals: | 8 |
| Percent of children who attained at least 80% of goals: | 42% |

| By Developmental Area - | Number Prescribed | Percent Achieved |
|---|---|---|
| Number of self-help goals achieved: | 25 | 80 |
| Number of gross motor goals achieved: | 28 | 61 |
| Number of fine motor goals achieved: | 22 | 77 |
| Number of social skills goals achieved: | 32 | 84 |
| Number of expressive language goals achieved: | 59 | 56 |
| Number of receptive language goals achieved: | 53 | 75 |
| Number of pre-orientation and mobility goals achieved: | 3 | 67 |

All of the children were evaluated at the end of the year. On the whole, they have attained, 70% of the total number of objectives set. Only eight (42%) of the children achieved at least 80% of the objectives established for them. Thus, the criterion originally established was not met. However, it should be noted that it is extremely difficult to identify accurately the degree to which the children will achieve their objectives because of the extent of their handicapping conditions. It is important to point out that 90% of the children achieved the majority of the goals set for them. Only two children were not able to achieve at least 50% of their objectives. These data would indicate that the goals, for the most part, were properly prescribed and that the activities planned for their achievement were successful. The most successful gains were in the social skills, self-help, fine motor, and receptive language areas; the least successful in gross motor, pre-orientation and mobility, and expressive language.

Placement. Eighteen students were placed in other programs either during or at the end of the year. Of 12 non-Boston children, 10 were placed in public or private programs in schools or communities outside of Boston (e.g., Commission for the Blind, Project Helo, Concord School for the Deaf). Two non-Boston children were enrolled in the Jackson-Mann Nursery School in the Boston Public Schools.

Five Boston children were placed in such private or public programs as Mass. Mental Health Early Intervention Project, Harvard St. Health Clinic and EISEC.

Slippage

The analysis of attainment of objectives by the students revealed that the criterion stated in the objective was not attained.

Contact with the agencies and individuals who constitute the referral network was delayed until December this year. It is possible that the delay in requesting assistance from these referral sources may have caused a delay in referral of some children, hence a delay in their achievement of objectives. However, it should be noted again that it is extremely difficult to specify accurately the degree to which the children will achieve their objectives because of their handicapping conditions; and in fact, 90% of the children did achieve the majority of their objectives.

## Parent/Family Participation

### Objectives

1. Ninety percent of parents (or other family member) will agree to participate in the parent program.
2. Eighty percent of parents will demonstrate improved ability to discuss their child's problems with staff.
3. Parents will be able to describe the capabilities of their children in various curriculum areas.
4. Parents will be aware of support services available (crisis intervention).
5. Parents will participate in the decision with regard to appropriate curriculum and movement to another program when indicated by progress of their child.
6. Parents will carry on home programs for their infants as developed collaborately with the staff.

### Attainments

The parent counseling model implemented has a three pronged approach, education, intellectual, and emotional. A total of 25 families were involved with one or more of these facets since September. The educational facet, essentially was to permit parents to gain an understanding of the infant teacher's role during treatment and their own role in follow-up activities at home. Their observation and participation in infant-teacher sessions was the major activity. Since September 9, parents of 16 children in continuous treatment participated in a total of 48 training/treatment sessions either at home or at the Center. In addition, seven group parent meetings were held.

A home hearing aid maintenance program was initiated with two mothers whose infants are new hearing aid users. Auditory stimulation, hearing aid use and trouble shooting have been the main areas of focus.

In the emotional facet of the model, 121 direct counseling sessions have occured with 16 parents. In addition, there have been less formal telephone contacts (N=128) during which the social worker has provided referral (N=25), information (N=54), counseling assistance (N=28) or follow-up (N=21). Crisis intervention services were provided to 6 parents. The social service component has also provided indirect services to parents through contact with referring agencies (N=26), other agencies involved with the case (N=56), referral to other agencies (N=30) and follow-up transfers (N=22).

Slippage

The intellectual phase of the model was to include a series of group meetings at which selected child development issues would be discussed to provide the parents with the opportunity to expand their knowledge with respect to the handicapping condition of their children. Such meetings were held but not well attended.

## In-Service Training for Project Staff

### Objective

To increase the knowledge and expertise of the project staff in the areas concerned with infant stimulation curriculum.

### Attainment

Fifteen in-service training sessions were held for two hours each. Each session was lead by the appropriate staff member who was a specialist in the topic of the training scheduled that day. Video and audio recordings of the sessions were made. All of the project staff attended all of the in-service meetings with the exception of two staff members who were ill for one session.

The schedule and topics of the in-service training sessions follows:

### In-Service Training Schedule

| | |
|---|---|
| Sept. 30 | THE DENVER DEVELOPMENTAL SCREENING TEST. What it is and how to administer it. |
| Oct. 7 | AUDIOLOGICAL PROBLEMS IN INFANCY |
| Oct. 28 | BLINDNESS - COMMON CAUSES IN INFANCY AND EDUCATIONAL IMPLICATIONS |
| Nov. 3 | AUDIOLOGICAL PROBLEMS IN INFANCY = Part 2 |
| Nov. 18 | NEUROMUSCULAR IMPAIRMENTS: Part One |
| Dec. 2 | INFANT SPEECH & LANGUAGE PROBLEMS - ASSESSMENT AND INTERVENTION |
| Dec. 9 | MOTHER-CHILD RELATIONSHIP AND INTERACTION IN INFANCY |

| | |
|---|---|
| Dec. 16 | MODES AND METHODS OF SERVICE DELIVERY |
| Dec. 23 | CRIB-O-GRAM RESEARCH |
| Jan. 20 | NEUROMUSCULAR IMPAIRMENTS: Part Two |
| Jan. 27 | NUTRITION, HEALTH & SAFETY FOR INFANTS AND YOUNG CHILDREN |
| Feb. 3 | PRINCIPLES AND PRACTICES OF PSYCHOTHERAPY |
| March 24 | CURRENT ISSUES IN MENTAL RETARDATION |
| March 31 | ASPECTS OF LABOR AND DELIVERY |
| April 28 | EPILEPSY |

Staff from the Jackson-Mann School, and graduate students from Boston University in speech and hearing were also invited to attend the sessions. Three students attended regularly. Unfortunately, none of the Jackson-Mann staff were able to attend since the time of the meetings interfered with the teaching schedule of the Jackson-Mann staff. A pediatrician from University Hospital and several medical interns conducted and attended several in-service training sessions.

The format of the meetings included an informal round table lecture and discussion with considerable use of audio-visual and written materials. Attached is a sample in-service training evaluation form which was completed by each staff member immediately following each session. The presentation which follows summarizes the participants' evaluations of the effectiveness of the in-service training sessions.

## Summary of Results of the Evaluation of the In-Service Training Sessions

1) Did you find the information helpful to your professional responsibilities?

   a) 90% of the project staff found the information in the sessions very helpful to their professional responsibilities.

   b) 10% of the project staff found the information in the sessions helpful to their professional responsibilities.

   c) None of the project members reported that the information was not very helpful.

2) Did you find that the information was presented in an interesting way?

   a) 85% of the project staff found that the information was presented in an interesting way.

   b) 15% of the project staff found that the information was presented in an interesting way.

   c) No staff member found that the information presented was not interesting.

3) As a result of this session, have your skills in dealing with handicapped children increased?

   a) 100% of the staff felt that their skills in dealing with handicapped children had increased as a result of the sessions.

   b) 75% felt their skills had increased greatly.

   c) 20% felt their skills had increased marginally.

   d) 5% felt their skills had increased minimally.

4) Were any audio-visual materials utilized? If yes, were they helpful? In 100% of the sessions, audio-visual or written materials were utilized.

   a) 65% of the staff found these materials very helpful.

   b) 35% found these materials helpful.

   c) No staff member found these materials inappropriate.

5) What was the strongest aspect of the training session?

   a) 75% of the staff felt that the questions and answers in each presentation was the strongest aspect of the sessions.

   b) 10% felt that the audio-visual materials were the strongest aspects of the sessions.

   c) 15% felt that the direct application of information to children served in the program was the strongest aspect of the sessions.

6) What was the weakest aspect of the training session?

   a) 60% of the staff felt the sessions had no weakest aspect.

   b) 25% of the staff felt the video-taping of the session was the weakest aspect in its distracting nature.

   c) 5% of the staff felt the extremely technical parts in some of the sessions were the weakest aspect.

Slippage

None.

## Demonstration - Dissemination

### Objectives

1. To inform the professional community about the project.
2. To make the project available to visitations by professionals and students.
3. To increase the quantity and quality of professionals in infant stimulation by providing clinical training placements for Boston University students.

### Attainments

Demonstration and dissemination continues as a focus of the third year of the project. The project serves as the major source of information about infant stimulation and hearing impairment in young children in the area. One hundred and three persons have visited the project this year, to observe its operation and meet with project staff. Included among the visitors have been students, teachers, doctors, social workers, and other professionals.

Workshops and professional lectures continued to be a major dissemination thrust. The following workshops or lectures have been presented by the project director since July, 1976.

| Group | Topic of Workshop Title |
|---|---|
| Boston Association for the Education of Young Children | Infant Stimulation |
| Boston Association for the Education of Young Children | Case Histories of Handicapped Infants (Presented by Project's Infant Teacher) |

| Group | Topic of Workshop Title |
|---|---|
| United Cerebral Palsy Meetings in Shrewsbury, MA, and Rutgers University, NJ | Language Difficulties in High Risk Infants |
| Connecticut Association for Children with Learning Disabilities | Remediation of Auditory Processing Problems |
| The Carroll School | Remediation of Auditory Processing Problems |
| Boston University - Undergraduate Courses in Health Dynamics, Oral Rehabilitation and Speech Pathology | Infant Stimulation |
| Boston Child Care Workers Association | Infant Stimulation |
| Jackson-Mann School Staff | Infant Stimulation |
| Jackson-Mann School Staff | Auditory Processing Problems |

Invited presentations and papers at conferences included:

Boston University-Medical Center Developmental Disabilities Conference, Worcester, MA

Pennsylvania Speech and Hearing Association, Harrisburg, PA

Canadian Speech and Hearing Association Convention, Halifax, Nova Scotia

Goddard College, Plainfield, VT

Boston University Alexander Graham Bell Centennial, Boston, MA (Presented Exhibit on Infant Stimulation Program.)

Massachusetts Speech and Hearing Association Convention, Framingham, MA (Presented Exhibit on Infant Stimulation Program.)

Alexander Graham Bell Association for the Deaf National Convention, Boston, MA (Presented Exhibit on Infant Stimulation Program)

1. Detection of Hearing Loss in Infancy
2. Methods and Modes of Service Delivery
3. Developing Basic Skills in Infants
4. Birth Defects

1. Principles and Practices of Psychotherapy I, II
2. Blindness in Infants
3. Aspects of Labor and Delivery
4. Critical Issues in Mental Retardation
5. Training Parents of Deaf Infants in Total Communication I, II, III

During the third year of the project, it again served as a training site for clinical placement of graduate students. Five students from Boston University, Department of Speech Pathology and Audiology spent two days a week training at the project for one semester each. One student nurse from Master's Program at Boston University School of Nursing spent one day a week training at the project. Two fourth-year medical students from the Boston University School of Medicine participated in several diagnostic evaluations. A total of sixteen individuals received training in early intervention with hearing impaired and/or multi-handicapped infants through clinical placements during the three years of the project.

Slippage

None.

## Advisory Council

### Objectives

1. An Advisory Council consisting of parents, community leaders and professional leaders will be continued.

2. The Advisory Council will play a major role in dissemination, continuation, and replication strategies.

### Attainments

The Advisory Council consisted of 14 members:

a) One parent of handicapped child.

b) Five audiologists representing the major diagnostic centers in the area.

c) A representative of the deaf adult community.

d) Two faculty members from Boston University involved in deaf education and audiology.

e) A representative from the Boston Center for the Blind.

f) One representative from the Massachusetts State Department of Education.

g) A representative of the professional special education community.

h) A representative from the Jackson-Mann Community.

i) One staff member.

At the first meeting of the Council on December 14, 1976, the following topics were discussed:

Assistance in identifying possible sources for continuing funding and locating sites for replication of various aspects of the program. With regard to continuing funding sources, the Department of Public Health has accepted responsibility for the educational management of infants 0-3. It was suggested that contacts already made with persons in that bureau be reminded of our need for funding. Also, it was identified that the Boston School Committee be informed of our need for support in

that area. It was further suggested that David Riley of the State Department of Education in charge of the Boston Project be contacted with regard to the approach to be used.

In addition, various board members voiced their willingness to write letters and/or make personal contacts with individuals who may be influential in effecting decision makers to continue the program.

Two subsequent meetings were held on March 3, 1977 and June 7, 1977. The focus of these meetings remained upon identifying and follow-up on possible sources for continuation funding.

Slippage

It had been planned to utilize the Advisory Council in a more active role this year in dissemination, continuation, and replication activities. Such increased Council activity did not completely occur.

Although initially it seemed beneficial to invite high level community and professional leaders to participate on the Advisory Council, in retrospect it seems that the members tended to overestimate the amount of time they would devote to the project. Therefore, it was necessary for the Project Director to undertake many tasks originally designated for the Advisory Council.

## Continuation

### Objective

To develop plans for continuation of the project.

### Attainments

Continuation efforts this year have focused on Boston University's Sargent College, Boston University's Center for Exceptional Citizens and the Massachusetts Department of Public Health and the Boston Public Schools.

Boston University has agreed to provide some services currently being offered by the project after its termination. Such services would most likely consist of audiological testing through its Department of Speech Pathology and Audiology. In fact, the Department has already begun to offer its assistance for the project. Of the total number of infants seen for audiological evaluations, 15 were evaluated at Boston University's Department of Speech Pathology and Audiology. The audiological facility at Boston University includes a two channel audiometer capable at presenting all auditory test stimuli (voice, noise, pure tones, recordings, noise makers, etc.) through both the headphones and speakers. The facility is also equipped with impedance and Conditioned Orientation Reflex Audiometry which are extremely useful with an infant population.

Contact was made in October with the State Department of Public Health. The continuation needs of the project were

outlined as well as the relationship of the program to the plans of the Department. The request for assistance was successful, as the Department agreed to underwrite the efforts of the project.

Thus, the project will continue to operate under the auspices of the Massachusetts Department of Public Health, Boston University, and the Boston Public Schools.

Slippage

None.

## Replication

### Objective

To develop tools to facilitate replication of the project for hearing impaired children.

### Attainments

Materials developed to facilitate replication include the following:

Video-Tape Programs:

1. Principles and Practices of Psychotherapy I, II
2. Blindness in Infants
3. Aspects of Labor and Delivery
4. Critical Issues in Mental Retardation
5. Training Parents of Deaf Infants in Total Communication I, II, III

Slide-Tape Programs:

1. Detection of Hearing Loss in Infancy
2. Methods and Modes of Service Delivery
3. Developing Basic Skills in Infants
4. Birth Defects

These audio-visual materials will be particularly useful in the training of infant educators, special educators, social workers, speech therapists, audiologists, physicians, nurses, and the like, thereby providing large numbers of

people with information about selected aspects of the project which may be useful within their own settings.

Workshops were conducted to explain and describe the techniques used in the program. These were held for early childhood specialists (Boston Association for the Education of Young Children), child care workers (Boston Child Care Workers Association), teachers (The Carroll School, Jackson-Mann School) and other professionals and parents (United Cerebral Palsy Associations of Rutgers University, Miami Beach, FL, and Shrewsbury, MA, the Connecticut Association for Children with Learning Disabilities, National Meeting of the Association for Children with Learning Disabilities, Council for Exceptional Children meeting at Atlanta, Boston University Medical School, and the Columbus Ohio Public Schools.)

Training of undergraduate and graduate students at Boston University is considered a major replication tool since the students who come from many parts of the nation and other countries as well will carry their introduction to infant stimulation processes back to their respective states or countries. Workshops have been provided to 88 undergraduate students in courses at Boston University and eight graduate students, as noted earlier, served as clinical interns or received training in the project.

Slippage

The Advisory Council was not yet as actively involved in replication as originally projected. In addition, though materials have been produced they have not yet been widely distributed. In particular, contact has not yet been made with those school systems in Massachusetts who have programs for hearing impaired children from 3-5 to promote extension of their services to the children 0-3 years old.

## Coordination With Other Agencies

### Objective

To develop and maintain liaisons with local schools, agencies, and hospitals concerned with multi-handicapped children.

### Attainments

As noted earlier in the report, substantial efforts contributed to contacting individuals and organizations, with emphasis upon securing sources of referrals. In addition, this past year emphasis was placed upon finding appropriate educational placements for children turning three in the project. Contact with schools, hospitals and social agencies has been directed toward developing coordination plans for joint referrals and resources sharing with agencies providing services complementary to or overlapping with the project.

Twenty-seven organizations--schools, hospitals, social agencies--which were contacted are involved in closer working relationships with the project. In addition to this increased involvement with the project, these agencies are expected to continue to serve as important sources of educational placements as well as for referrals. The organizations were:

1. Martha Eliot Family Health Clinic
2. Department of Child Guardianship
3. Roxbury Medical and Dental Group
4. Horace Mann School Evaluation Unit
5. University Hospital O.T. Department
6. Massachusetts Eye and Ear Infirmary
7. Robbins Speech and Hearing Clinic
8. Massachusetts General Hospital
9. Jeremiah Burke High School

10. Roxbury High School
11. Department of Public Health Dev. Unit
12. N.E. Medical Center
13. B.U. Center for Exceptional Citizens
14. BEBC
15. Emerson College - Thayer-Lindsey Nursery
16. Mass Hospital School
17. Boston Center for the Blind
18. Jackson-Mann Nursery School
19. Brookside Family Life Center
20. Cambridge-Somerville Nursery School
21. Parents' and Children's Service
22. United Cerebral Palsy Assoc. of Greater Metropolitan Boston
23. Beginning Center in Canton
24. Harvard Street Health Clinic
25. Children's Protective Services
26. Project HELO
27. Mass Mental Health - Early Intervention Program, Developmental Disabilities

Importantly, the project has begun to be perceived by other agencies as a supportive program, going beyond its confines to work with other agencies on their own grounds. Staff members are now consultants for the Boston Center for the Blind and the Jackson-Mann Nursery School. The project has also become a referral source to other agencies, particularly the major hospitals. Most significantly, the staff has been involved with case meetings with appropriate personnel who also serve the children at other agencies. To date, the project staff has participated in three case evaluations of children served by the project.

Slippage

None.

## Research Component

### Objective

To encourage and participate in research concerning early detection and treatment of hearing impairment.

### Attainment

1. Crib-O-Gram Study: (Currently in process)

Burton F. Jaffe, M.D.
Senior Otolaryngologist
Children's Hospital Medical Center
Assistant Clinical Professor of Otolaryngology
Harvard Medical School

Eleanor Semel
Project Director

The purpose of this project is to validate the Crib-O-Gram approach to the hearing screening and high risk infants. Various tests, such as Marion Downs' warblet and arousal response have been used as screening for hearing loss, but each has been hampered by requiring extensive time commitments from trained personnel, and each has been troubled by subjective evaluation of the responses. Yet, the need for evaluating hearing loss in newborns persists since a delay in diagnosis is detrimental to speech, language, and behavior. If deafness can be identified early, rehabilitation for infant and parents is ideally begun at ages six to nine months.

Blair Simmons described an objective, safe, and automated newborn hearing screening test - the Crib-O-Gram. He has utilized it at Stanford University newborn nurseries from October, 1971 to the present time. More recently, he has concentrated his efforts in the intensive care and premature

a) warblet pure tones (control procedure)

500 1K 2K #2

b) octave ban stimuli (experimental procedure)

500 1k 2k Octave bands

Behavioral observation audimetry will be used as test procedure.

3. A Survey Designed to Detect Hearing Loss in Infants (Master's Thesis) (Completed)

Lori Chaiet
Department of Speech Pathology and Audiology, Boston University

Location of babies at risk for hearing loss has been exceedingly difficult due to minimal follow-up procedures at hospitals, few methods devised to identify and detect hearing impaired infants, and lack of public education in the area of recognition of childhood hearing loss. The survey was undertaken for the above reasons. It was successful in attaining the following goals:

1. Detecting suspected cases of hearing loss
2. Locating and contacting parents of suspected babies
3. Audiometric evaluation of suspected babies
4. Educating and alerting parents about the possibility of hearing impairment in babies
5. Increasing community awareness of the purpose of the Program for referral and free treatment services

4. Early Language Development (Clinical Paper) (In Progress)

Anita Ouellette
Department of Speech Pathology and Audiology, Boston University

nurseries where the yield for identifying deafness was 1.86 infants screened. We would like to assist in validating this high yield at Boston Hospital for Women. This test represents a great promise for achieving hearing screening at a low cost (85¢/test), safely, and objectively.

Follow-up will include behavioral audiometry in a suitable test environment at six to eight months of age for those who fail crib-o-gram, and at 18 months of age for those who pass the crib-o-gram. A post card questionnaire, telephone, or personal contact will also be made by members of the Infant Stimulation Staff.

2. The Use of Frequency Calibrated Stimuli for Use in Pediatric Audiological Evaluation and Treatment (0-2):
(Master's Thesis)
(Currently in process)

Eleanor Semel, Ed.D.
Project Director
Infant Stimulation Project
Associate Professor
Sargent College, Speech Pathology and Audiology Dept.

Debra Kavesh, Audiologist
Infant Stimulation Project
Sargent College, Boston University

Octave bands will be isolated on an Arp synthesizer. Band pass filers and noise reduction units will be utilized in order to decrease the amount of harmonic distortion present in tapes.

Tapes as diagnostic instrument - infants will be tested using:

A critical review of the developmental process of language from ages 0-3 years.

| | |
|---|---|
| 5. Training Parents of Deaf Infants in Total Communication (Master's Thesis) Completed) | Ann Marie Teuber<br>Department of Speech Pathology and Audiology, Boston University |

The development and evaluation of three techniques of teaching vocabulary to parents in total communication lessons were videotaped.

Slippage

None.

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